

PACK BATTERY WITH BUILT-IN NON-AQUEOUS SECONDARY BATTERY AND ELECTRIC EQUIPMENT PROVIDED WITH THIS PACK BATTERY

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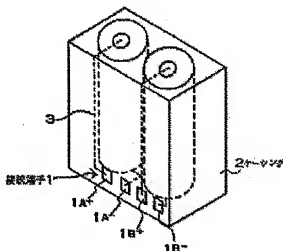
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Abstract of JP6076812

PURPOSE: To charge plural non-aqueous secondary batteries, which are built in a pack battery, at a good balance without overcharge.

CONSTITUTION: In a pack battery, plural non-aqueous secondary batteries are built, and connecting terminals 1, which are connected to each plus/minus pole of each secondary battery, are provided in a casing 2. Electric equipment 6 is provided with a connection part, which is to be connected to the connecting terminals 1 to connect the secondary batteries in series when the pack battery is installed on the electric equipment 6.

Consequently, in a pack battery, plural batteries can be charged under the condition that they are connected in parallel with each other, and plural non-aqueous secondary batteries can be charged at a good balance to prolong the cycle life. When the pack battery is installed on the electric equipment, the secondary batteries are connected in series to supply the power.



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Family list**1** family member for: **JP6076812**

Derived from 1 application

[Back to JP6076812](#)**1 PACK BATTERY WITH BUILT-IN NON-AQUEOUS SECONDARY
BATTERY AND ELECTRIC EQUIPMENT PROVIDED WITH THIS PACK
BATTERY****Inventor:** KUNIGA TOSHIHARU**Applicant:** SANYO ELECTRIC CO**EC:** H01M2/10C2C2**IPC:** H01M2/10; H01M2/30; H01M2/10 (+3)**Publication info:** **JP6076812 A** - 1994-03-18

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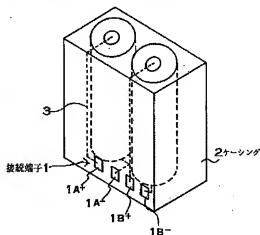
(54) 【発明の名称】 非水系二次電池を内蔵するバック電池およびこのバック電池を備えた電気機器

(57) 【要約】

【目的】 バック電池に内蔵される複数の非水系二次電池を過充電することなくバランスよく充電できるようにする。

【構成】 バック電池は、非水系の二次電池を複数個内蔵し、各々の二次電池の＋極に接続された接続端子 1 をケーシング 2 に設けている。電気機器 6 は、バック電池を装着すると、接続端子 1 に接続されて二次電池を直列に接続する接続部を備える。

【効果】 バック電池は、複数の電池を並列に接続して充電でき、複数の非水系二次電池をバランスよく充電して、サイクル寿命を延長できる。電気機器はバック電池を装着すると二次電池を直列に接続して電力を供給する。



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【特許請求の範囲】

【請求項1】 非水系の二次電池を複数個内蔵するバック電池において、各々の二次電池の＋極に接続された接続端子(1)がケーシング(2)に設けられたことを特徴とする非水系二次電池を内蔵するバック電池。

【請求項2】 非水系の二次電池を複数個内蔵し、各々の二次電池の＋極に接続された接続端子(1)がケーシング(2)に設けられたバック電池を脱着自在に備えた電気機器であって、装着されたバック電池の接続端子(1)に電気的に接続され、バック電池内の二次電池を直列接

続する接続部を備えたことを特徴とするバック電池を備えた電気機器。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、複数の非水系二次電池を内蔵するバック電池と、このバック電池を備えた電気機器とに関する。

【0002】

【従来の技術】 リチウムイオン二次電池等の非水系二次電池は、ニッケルカドミウム電池に比較すると電圧が約3倍も高く、しかも高容量な性質がある。したがってリチウムイオン二次電池を内蔵するバック電池は、小型で高容量とすることができる。ところで、非水系二次電池は、過充電すると電池性能が低下する性質がある。過充電を防止して充電時間を短くするために、初期は定電圧充電し、電圧が設定値に近くなると定電圧充電に切り替えている。すなわち、電池電圧が低くて過充電にならないときには、定電圧充電して所定の電流で充電する。電池電圧が設定値に近くなると定電圧充電に切り替えて過充電を防止している。最初から定電圧充電すると、充電の初期に過大な充電電流が流れる弊害がある。最後に定電流充電すると、過充電する弊害がある。

【0003】

【発明が解決しようとする課題】 複数個の非水系二次電池を直列に接続したバック電池は、定電流から定電圧充電に切り替えて充電する方法によっても、理想的な状態で充電できない。とくに、最後に定電圧充電しても過充電となって、電池性能が低下してサイクル寿命が短くなる性質がある。それは、非水系二次電池の充電特性が、ニッケルカドミウム電池等とはことなることが理由である。すなわち、ニッケルカドミウム電池は、満充電になると電圧がピーク値となり、さらに充電すると電圧が低下する性質がある。これに対して、非水系二次電池であるリチウムイオン二次電池は、充電する電圧が4.2Vまで上昇し、さらに充電すると電圧は次第に上昇する性質がある。すなわち、ニッケルカドミウム電池のように満充電になって、電圧が一定にならず、充電が進行するにしたがって次第に上昇する性質がある。

【0004】 この性質のある非水系二次電池を複数個直列に接続したバック電池は、充電するときに、各々の二

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次電池の電圧を均一に揃えることができない。例えば、2個のリチウムイオン二次電池を直列に接続したバック電池を定電圧充電すると、一方の電池の電圧が高く、他方の電圧が低くなることある。1個のリチウムイオン二次電池の満充電時の電圧を4.2Vとして、2個直列で8.4Vの定電圧充電すると、一方の電池の電圧は4.3Vとなり、他方の電池電圧は4.1Vとなることある。このとき、4.3Vとなった電池は、過充電となって電池性能が低下し、4.1Vの電池は満充電されない。したがって、複数の非水系二次電池を内蔵するバック電池は、充電の最後に定電圧充電しても、単電池の過充電による電池性能の低下を防止することができない。困ったことに、複数の二次電池を内蔵するバック電池は、何れかの電池の性能が低下すると全体の性能が低下して使用できなくなる。

【0005】 本発明は、この欠点を解決することを目的に開発されたものである。本発明の重要な目的は、非水系二次電池を理想的な状態で充電できる複数の非水系二次電池を内蔵するバック電池とこのバック電池を備えた電気機器を提供することにある。

【0006】

【課題を解決するための手段】 本発明のバック電池と、このバック電池を備えた電気機器は、前述の目的を達成するために下記の構成を備える。すなわち、本発明のバック電池は、非水系の二次電池を複数個内蔵するものを改良したもので、内蔵する各々の二次電池の＋極に接続された接続端子1をケーシング2に設けていることを特徴とする。

【0007】 さらに、バック電池を備えた電気機器は、非水系の二次電池を複数個内蔵し、各々の二次電池の＋極に接続された接続端子(1)がケーシング(2)に設けられたバック電池を脱着自在に備えたもので、装着されたバック電池の接続端子(1)に電気的に接続され、バック電池内の二次電池を直列接続する接続部を備えたことを特徴とする。

【0008】

【作用】 本発明のバック電池は、内蔵するそれぞれの非水系二次電池の＋の電極に接続された接続端子1を設けているので、充電するときは、複数の非水系二次電池を並列に接続することができ、並列接続状態で充電される非水系二次電池は、各電池の電圧差ができず、それぞれの電池を同じ電圧で充電できる。また、使用するときには、各々の電池を直列に接続して使用し、あるいは、必要ならば並列に接続して使用することもできる。

【0009】 さらに、本発明のバック電池を脱着自在に備えた電気機器は、バック電池を電気機器から外し、二次電池を並列に接続して電圧差ができないようにして充電できる。また、バック電池を電気機器にセットすると、接続端子を介して複数の二次電池を直列に接続して電気機器の電源に使用される。

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【0010】

【実施例】以下、本発明の実施例を図面に基づいて説明する。ただし、以下に示す実施例は、本発明の技術思想を具体化するためのバック電池とバック電池を備えた電気機器を例示するものであって、本発明のバック電池と電気機器は、構成部品の種類、タイプ、材質、形状、構造、配置を下記のものに特定するものでない。本発明のバック電池と電気機器は、特許請求の範囲において、種々の変更を加えることができる。

【0011】さらに、この明細書は、特許請求の範囲を
10 理解し易いように、実施例に示される部材に対応する番号を、「特許請求の範囲の欄」、「作用の欄」、および「課題を解決するための手段の欄」に示される部材に付記している。ただ、特許請求の範囲に示される部材を、実施例の部材に特定するものでは決してない。

【0012】図1に示すバック電池はケーシング2内に2個の非水系二次電池であるリチウムイオン二次電池を内蔵している。ケーシング2には、4個の接続端子1A+、1A-、1B+、1B-を設けている。それぞれの接続端子1A+、1A-、1B+、1B-には、2個の電池の+極と-極とをリード線3を介して接続している。電池と接続端子1との接続状態を図2に示している。この図のバック電池は、接続端子1A+、1A-、1B+、1B-は下記のように接続されている。

1A+……………電池Aの+極
1A-……………電池Aの-極
1B+……………電池Bの+極
1B-……………電池Bの-極

【0013】このように電池を接続端子1に接続したバック電池は、接続端子1を介して2個の電池を並列に接続して充電する。すなわち、接続端子1A+と1B+とを充電器4の+側に接続し、接続端子1A-と1B-とを充電器4の-側に接続して充電する。充電するときの接続状態を図3に示している。この構造の充電器4は、4個の充電端子5を有し、+側の充電端子5はダイオードを介して電源の+側に、-側の充電端子5は電源の-側に接続されている。充電器4の充電端子5を、バック電池の接続端子1に接触すると、電源から二次電池に通電して充電する。

【0014】充電器4は、互いに並列に接続された2個の二次電池を、同じ電圧として充電する。このため、2個の非水系二次電池は、片方の電圧が上昇して過充電となることがなく、同じ条件で充電される。

【0015】充電器4は、好ましくは、最初は定電流充電し、電池の電圧が所定の電圧に上昇して満充電に近付くと、定電圧充電に切り替えて過充電を防止する。

【0016】図4は、図1と図2とに示すバック電池を脱着自在に備えた電気機器6を示す。図4に示す電気機器6は、装着されたバック電池の接続端子(1)に電気的に接続され、バック電池内の二次電池を直列接続する接
50 路部

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統部を備える。接続部は、バック電池の接続端子1に接続される4個の機器端子7を備える。機器端子7は、2個の電池を直列に接続して使用する。このため、バック電池の接続端子1A-と1B+とに接続される機器端子7は、内部で接続されている。接続端子1A+に接続される機器端子7は機器の+側に、接続端子1B-に接続される電池を機器の-側に接続している。

【0017】さらに、図5は、4個の非水系二次電池を内蔵するバック電池を装着する電気機器6を示している。この図に示す電気機器に装着されるバック電池は、2個の電池を直列に接続したものを並列に接続して使用している。この図に示すバック電池は、充電するときには、全ての電池を並列に接続して充電する。

【0018】さらに図6に示すバック電池は、使用するときに内蔵電池を直列に接続するスイッチ8を備えている。スイッチ8は、接続端子1A-と1B+とに接続されている。スイッチ8をオンにすると、2個の電池は互いに直列に接続される。このバック電池は、電気機器6にセットして使用するときにはスイッチ8をオンに切り替える。スイッチ8をオンにすると、バック電池は、この構造のバック電池は、+側の機器端子7を有する通常の電気機器6にそのまま使用できる特長がある。また、図示しないが、バック電池を電気機器6にセットするとスイッチ8がオンになり、電気機器6から離すとオフになる機構を利用すると、スイッチ8を手動で操作することなく、電池を直列接続して便利に使用できる特長がある。

【0019】

【発明の効果】本発明の複数の二次電池を内蔵するバック電池と、このバック電池を装着する電気機器は、充電すると電圧が次第に上昇する非水系二次電池を、バランスよく充電できる特長がある。それは、それぞれの二次電池の+極に接続された接続端子をケーシングに設けているので、充電するときには、全ての非水系二次電池を並列に接続して充電できるからである。このため、本発明のバック電池とこのバック電池を装着する電気機器は、内蔵する全ての非水系二次電池を過充電することなく理想的な状態で充電できる。したがって、従来のように、充電時に特定の電池が充電禁止電圧に上昇することがなく、電池のアンバランス充電による劣化を効果的に防止してサイクル寿命を延長できる特長がある。また、本発明の電気機器は、バック電池を装着すると、接続部で二次電池を直列に接続するので、従来のバック電池と同様に簡単にかつ便利に使用できる。

【図面の簡単な説明】

【図1】本発明の実施例にかかるバック電池を示す斜視図

【図2】図1に示すバック電池の回路図

【図3】図1に示すバック電池を充電する状態を示す回路図

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【図4】図1に示すパック電池の使用例を示す回路図

【図5】本発明の他の実施例のバック電池の使用例を示す回路図

【図6】さらに、本発明の他の実施例のバック電池を示す回路図

【符号の説明】

1.....接続端子

1A+.....一方の電池の+極に接続された接続端子

1A-.....一方の電池の-極に接続された接続端子

1B+.....他方の電池の+極に接続された接続端子

1B-.....他方の電池の-極に接続された接続端子

2.....ケーシング

3.....リード線

4.....充電器

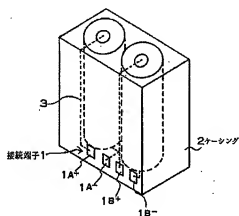
5.....充電端子

6.....電気機器

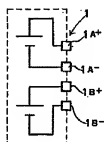
7.....機器端子

8.....スイッチ

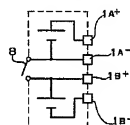
【図1】



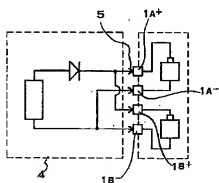
【図2】



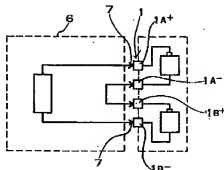
【図6】



【図3】



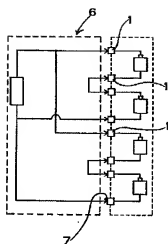
【図4】



(5)

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【図5】



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CLAIMS

[Claim(s)]

[Claim 1]An and pack battery having a nonaqueous secondary battery, wherein a contact button (1) connected to +pole of each rechargeable battery is provided in a casing (2) in an and pack battery having two or more rechargeable batteries of a non-drainage system.

[Claim 2]A contact button (1) which contained two or more rechargeable batteries of a non-drainage system, and was connected to +pole of each rechargeable battery is the electric appliance provided with an and pack battery formed in a casing (2) enabling free desorption, An electric appliance provided with an and pack battery provided with a terminal area which is electrically connected to a contact button (1) of an and pack battery with which it was equipped, and does the series connection of the rechargeable battery in an and pack battery.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention relates to the and pack battery having two or more nonaqueous secondary batteries, and the electric appliance provided with this and pack battery.

[0002]

[Description of the Prior Art]Nonaqueous secondary batteries, such as a rechargeable lithium-ion battery, have voltage about 3 times high as compared with a nickel-cadmium battery, and there is character [high capacity moreover]. Therefore, the and pack battery having a rechargeable lithium-ion battery is small, and can be made into high capacity. By the way, when a nonaqueous secondary battery is overcharged, it has the character in which battery capacity falls. In order to prevent a surcharge and to shorten charging time, constant current charge was carried out the first stage, and if voltage becomes close to a preset value, it has changed to constant potential charge. That is, when cell voltage is low and does not become a surcharge, constant current charge is carried out and it charges with predetermined current. If cell voltage becomes close to a preset value, it would change to constant potential charge and the surcharge will be prevented. When constant potential charge is carried out from the beginning, there is evil into which excessive charging current flows in early stages of charge. When constant current charge is carried out to the last, there is evil to overcharge.

[0003]

[Problem(s) to be Solved by the Invention]The and pack battery which connected two or more nonaqueous secondary batteries in series cannot be charged in the ideal conditions by the method of changing to constant potential charge and charging it from constant current. There is character in which it becomes a surcharge even if it carries out constant potential charge to the last especially, and battery capacity falls and a cycle life becomes short. it -- the charging characteristic of a nonaqueous secondary battery -- a nickel-cadmium battery etc. -- things -- things are reasons. That is, if it becomes a full charge, voltage will serve as a peak value, and a nickel-cadmium battery has the character in which a cell falls, when it charges further. On the other hand, when the voltage to charge rises to 4.2V and the rechargeable lithium-ion battery which is a nonaqueous secondary battery is charged further, voltage has the character to go up gradually. That is, it becomes a full charge like a nickel-cadmium battery, and voltage does not become fixed, but there is character to go up gradually as charge advances.

[0004]The and pack battery which connected two or more nonaqueous secondary batteries with this character to series cannot arrange voltage of each rechargeable battery uniformly, when charging. For example, when constant potential charge of the and pack battery which connected two rechargeable lithium-ion batteries in series is carried out, the voltage of one cell may be high and the voltage of another side may become low. Voltage at the time of the full charge of one rechargeable lithium-ion battery is set to 4.2V, it is in-series two pieces and there is a thing which is 8.4V and for which the voltage of one cell will be set to 4.3V, and the cell voltage of another side will be set to 4.1V if constant potential charge is carried out. At this time, the cell used as 4.3V serves as a surcharge, battery capacity falls, and the full charge of the cell which is 4.1V is not carried out. Therefore, even if it carries out constant potential charge of the and

pack battery having two or more nonaqueous secondary batteries to the end of charge, it cannot prevent the fall of the battery capacity by the surcharge of a cell. When the performance of which cell falls, it becomes impossible for the whole performance to fall and use the and pack battery which contains two or more rechargeable batteries in having been troubled.

[0005] This invention is developed for the purpose of solving this fault. The important purpose of this invention is to provide the electric appliance provided with the and pack battery having two or more nonaqueous secondary batteries which can charge a nonaqueous secondary battery in the ideal conditions, and this and pack battery.

[0006]

[Means for Solving the Problem] An electric appliance provided with an and pack battery of this invention and this and pack battery is provided with the following composition in order to attain the above-mentioned purpose. That is, the contact button 1 connected to + pole of each rechargeable battery which an and pack battery of this invention is what improved what builds in two or more rechargeable batteries of a non-drainage system, and is built in is formed in the casing 2.

[0007] It is what a contact button (1) which an electric appliance provided with an and pack battery contained two or more rechargeable batteries of a non-drainage system, and was connected to + pole of each rechargeable battery equipped with an and pack battery formed in a casing (2) enabling free desorption. It was electrically connected to a contact button (1) of an and pack battery with which it was equipped, and had a terminal area which does the series connection of the rechargeable battery in an and pack battery.

[0008]

[Function] Since the and pack battery of this invention has formed the connection **** contact button 1 in the electrode of +- of each nonaqueous secondary battery to build in, when charging, it can connect two or more nonaqueous secondary batteries in parallel. The nonaqueous secondary battery charged by a parallel connection state cannot do voltage difference of each cell, but can charge each cell on the same voltage. When using it, each cell is used, connecting in series, or if necessary, it can also be used, connecting in parallel.

[0009] It can remove an and pack battery from an electric appliance, the electric appliance provided with the and pack battery of this invention enabling free desorption connects a rechargeable battery in parallel, and as it cannot do voltage difference, it can charge it. If an and pack battery is set to an electric appliance, two or more rechargeable batteries will be connected in series via a contact button, and it will be used for the power supply of an electric appliance.

[0010]

[Example] Hereafter, the example of this invention is described based on a drawing. However, the example shown below illustrates the electric appliance provided with the and pack battery and and pack battery for materializing the technical thought of this invention, and the and pack battery or electric appliance of this invention do not specify the kind of component parts, a type, construction material, shape, structure, and arrangement as the following. The and pack battery and electric appliance of this invention can add various change in a claim.

[0011] This specification has appended the number corresponding to the member shown in an example to the member shown in "the column of a claim", "the column of an operation", and "the column of The means for solving a technical problem" so that it may be easy to understand a claim. However, there is never nothing what specifies the member shown in a claim as the member of an example.

[0012] The and pack battery shown in drawing 1 contains the rechargeable lithium-ion battery which are two nonaqueous secondary batteries in the casing 2. Four contact button 1A+, 1A-, 1B+, and 1B- are provided in the casing 2. + pole and - pole of two cells are connected to each contact button 1A+, 1A-, 1B+, and 1B- via the lead 3. The connected state of a cell and the contact button 1 is shown in drawing 2. As for contact button 1A+, 1A-, 1B+, and 1B-, the and pack battery of this figure is connected as follows.

1A+ [..... + pole 1B of the cell B / - Cell B / - Very] + pole 1A of the cell A - Cell A - It is 1B+ very much. [0013] Thus, via the contact button 1, the and pack battery which

connected the cell to the contact button 1 connects two cells in parallel, and is charged. That is, contact button 1A+ and 1B+ are connected to + side of the battery charger 4, contact button 1A- and 1B- are connected to - side of the battery charger 4, and it charges. The connected state when charging is shown in drawing 3. The battery charger 4 of this structure has the four charging terminals 5, and, as for the charging terminal 5 by the side of +, the charging terminal 5 by the side of - is connected to - side of a power supply via the diode at + side of a power supply. From a power supply, it will energize to a rechargeable battery and the charging terminal 5 of the battery charger 4 will be charged, if the contact button 1 of an and pack battery is contacted.

[0014]The battery charger 4 charges two rechargeable batteries connected in parallel mutually as the same voltage. For this reason, voltage of one of the two rises, and two nonaqueous secondary batteries do not serve as a surcharge, and are charged on the same conditions.

[0015]Preferably, at first, constant current charge of the battery charger 4 is carried out, and if the voltage of a cell rises on predetermined voltage and approaches a full charge, it will be changed to constant potential charge and will prevent a surcharge.

[0016]Drawing 4 shows the electric appliance 6 provided with the and pack battery shown in drawing 1 and drawing 2 enabling free description. It is electrically connected to the contact button (1) of the and pack battery with which it was equipped, and the electric appliance 6 shown in drawing 4 is provided with the terminal area which does the series connection of the rechargeable battery in an and pack battery. A terminal area has the four equipment terminals 7 connected to the contact button 1 of an and pack battery. Two cells are used for the equipment terminal 7, connecting in series. For this reason, the equipment terminal 7 connected to contact button 1A- and 1B+ of an and pack battery is connected inside. The equipment terminal 7 connected to contact button 1A+ has connected to + side of apparatus the cell connected to contact button 1B- at - side of apparatus.

[0017]Drawing 5 shows the electric appliance 6 equipped with the and pack battery having four nonaqueous secondary batteries. What connected two cells in series is being used for the and pack battery with which the electric appliance shown in this figure is equipped, connecting in parallel. When charging, the and pack battery shown in this figure connects all the cells in parallel, and is charged.

[0018]The and pack battery furthermore shown in drawing 6 is provided with the switch 8 which connects an internal battery in series when using it. The switch 8 is connected to contact button 1A- and 1B+. If the switch 8 is carried out to one, two cells of each other will be connected in series. This and pack battery changes the switch 8 to one, when using it, setting to the electric appliance 6, and when charging, it changes the switch 8 to OFF. The and pack battery of this structure has the feature which can be used for the usual electric appliance 6 which has the equipment terminal 7 of +- as it is. There is the feature which carries out the series connection of the cell and can use it conveniently without operating the switch 8 manually if the mechanism which the switch 8 will be turned on if an and pack battery is set to the electric appliance 6, and will be come by off if it separates from the electric appliance 6 is used, although not illustrated.

[0019]

[Effect of the Invention]The and pack battery having two or more rechargeable batteries of this invention and the electric appliance equipped with this and pack battery have the feature that voltage can charge the nonaqueous secondary battery which goes up gradually with sufficient balance, when it charges. Since it has provided the contact button connected to +-pole of each rechargeable battery in the casing, when charging, it is because all the nonaqueous secondary batteries are connected in parallel and it can charge. For this reason, the electric appliance equipped with the and pack battery and this and pack battery of this invention can be charged in the ideal conditions, without overcharging all the nonaqueous secondary batteries to build in.

Therefore, like before, a cell specific at the time of charge does not go up to charging forbidden voltage, and there is the feature that degradation by imbalanced charge of a cell is prevented effectively, and a cycle life can be extended. Since a rechargeable battery will be connected in series in a terminal area if it equips with an and pack battery, the electric appliance of this invention can be used simply and conveniently like the conventional and pack battery.

[Translation done.]

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TECHNICAL FIELD

[Industrial Application] This invention relates to the and pack battery having two or more nonaqueous secondary batteries, and the electric appliance provided with this and pack battery.

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PRIOR ART

[Description of the Prior Art]Nonaqueous secondary batteries, such as a rechargeable lithium-ion battery, have voltage about 3 times high as compared with a nickel-cadmium battery, and there is character [high capacity moreover]. Therefore, the and pack battery having a rechargeable lithium-ion battery is small, and can be made into high capacity. By the way, when a nonaqueous secondary battery is overcharged, it has the character in which battery capacity falls. In order to prevent a surcharge and to shorten charging time, constant current charge was carried out the first stage, and if voltage becomes close to a preset value, it has changed to constant potential charge. That is, when cell voltage is low and does not become a surcharge, constant current charge is carried out and it charges with predetermined current. If cell voltage becomes close to a preset value, it would change to constant potential charge and the surcharge will be prevented. When constant potential charge is carried out from the beginning, there is evil into which excessive charging current flows in early stages of charge. When constant current charge is carried out to the last, there is evil to overcharge.

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EFFECT OF THE INVENTION

[Effect of the Invention]The and pack battery having two or more rechargeable batteries of this invention and the electric appliance equipped with this and pack battery have the feature that voltage can charge the nonaqueous secondary battery which goes up gradually with sufficient balance, when it charges. Since it has provided the contact button connected to +pole of each rechargeable battery in the casing, when charging, it is because all the nonaqueous secondary batteries are connected in parallel and it can charge. For this reason, the electric appliance equipped with the and pack battery and this and pack battery of this invention can be charged in the ideal conditions, without overcharging all the nonaqueous secondary batteries to build in. Therefore, like before, a cell specific at the time of charge does not go up to charging forbidden voltage, and there is the feature that degradation by imbalanced charge of a cell is prevented effectively, and a cycle life can be extended. Since a rechargeable battery will be connected in series in a terminal area if it equips with an and pack battery, the electric appliance of this invention can be used simply and conveniently like the conventional and pack battery.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]The and pack battery which connected two or more nonaqueous secondary batteries in series cannot be charged in the ideal conditions by the method of changing to constant potential charge and charging it from constant current. There is character in which it becomes a surcharge even if it carries out constant potential charge to the last especially, and battery capacity falls and a cycle life becomes short. it — the charging characteristic of a nonaqueous secondary battery — a nickel-cadmium battery etc. — things — things are reasons. That is, if it becomes a full charge, voltage will serve as a peak value, and a nickel-cadmium battery has the character in which a cell falls, when it charges further. On the other hand, when the voltage to charge rises to 4.2V and the rechargeable lithium-ion battery which is a nonaqueous secondary battery is charged further, voltage has the character to go up gradually. That is, it becomes a full charge like a nickel-cadmium battery, and voltage does not become fixed, but there is character to go up gradually as charge advances.

[0004]The and pack battery which connected two or more nonaqueous secondary batteries with this character to series cannot arrange voltage of each rechargeable battery uniformly, when charging. For example, when constant potential charge of the and pack battery which connected two rechargeable lithium-ion batteries in series is carried out, the voltage of one cell may be high and the voltage of another side may become low. Voltage at the time of the full charge of one rechargeable lithium-ion battery is set to 4.2V, it is in-series two pieces and there is a thing which is 8.4V and for which the voltage of one cell will be set to 4.3V, and the cell voltage of another side will be set to 4.1V if constant potential charge is carried out. At this time, the cell used as 4.3V serves as a surcharge, battery capacity falls, and the full charge of the cell which is 4.1V is not carried out. Therefore, even if it carries out constant potential charge of the and pack battery having two or more nonaqueous secondary batteries to the end of charge, it cannot prevent the fall of the battery capacity by the surcharge of a cell. When the performance of which cell falls, it becomes impossible for the whole performance to fall and use the and pack battery which contains two or more rechargeable batteries in having been troubled.

[0005]This invention is developed for the purpose of solving this fault. The important purpose of this invention is to provide the electric appliance provided with the and pack battery having two or more nonaqueous secondary batteries which can charge a nonaqueous secondary battery in the ideal conditions, and this and pack battery.

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MEANS

[Means for Solving the Problem]An electric appliance provided with an and pack battery of this invention and this and pack battery is provided with the following composition in order to attain the above-mentioned purpose. That is, the contact button 1 connected to +pole of each rechargeable battery which an and pack battery of this invention is what improved what builds in two or more rechargeable batteries of a non-drainage system, and is built in is formed in the casing 2.

[0007]It is what a contact button (1) which an electric appliance provided with an and pack battery contained two or more rechargeable batteries of a non-drainage system, and was connected to +pole of each rechargeable battery equipped with an and pack battery formed in a casing (2) enabling free desorption, It was electrically connected to a contact button (1) of an and pack battery with which it was equipped, and had a terminal area which does the series connection of the rechargeable battery in an and pack battery.

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OPERATION

[Function] Since the and pack battery of this invention has formed the connection **** contact button 1 in the electrode of + of each nonaqueous secondary battery to build in, when charging, it can connect two or more nonaqueous secondary batteries in parallel. The nonaqueous secondary battery charged by a parallel connection state cannot do voltage difference of each cell, but can charge each cell on the same voltage. When using it, each cell is used, connecting in series, or if necessary, it can also be used, connecting in parallel.

[0009] It can remove an and pack battery from an electric appliance, the electric appliance provided with the and pack battery of this invention enabling free desorption connects a rechargeable battery in parallel, and as it cannot do voltage difference, it can charge it. If an and pack battery is set to an electric appliance, two or more rechargeable batteries will be connected in series via a contact button, and it will be used for the power supply of an electric appliance.

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EXAMPLE

[Example]Hereafter, the example of this invention is described based on a drawing. However, the example shown below illustrates the electric appliance provided with the and pack battery and and pack battery for materializing the technical thought of this invention, and the and pack battery or electric appliance of this invention do not specify the kind of component parts, a type, construction material, shape, structure, and arrangement as the following. The and pack battery and electric appliance of this invention can add various change in a claim.

[0011]This specification has appended the number corresponding to the member shown in an example to the member shown in "the column of a claim", "the column of an operation", and "the column of The means for solving a technical problem" so that it may be easy to understand a claim. However, there is never nothing what specifies the member shown in a claim as the member of an example.

[0012]The and pack battery shown in drawing 1 contains the rechargeable lithium-ion battery which are two nonaqueous secondary batteries in the casing 2. Four contact button 1A+, 1A-, 1B+, and 1B- are provided in the casing 2. + pole and - pole of two cells are connected to each contact button 1A+, 1A-, 1B+, and 1B- via the lead 3. The connected state of a cell and the contact button 1 is shown in drawing 2. As for contact button 1A+, 1A-, 1B+, and 1B-, the and pack battery of this figure is connected as follows.

1A+ [..... + pole 1B of the cell B / - Cell B / - Very] + pole 1A of the cell A - Cell A - It is 1B+ very much. [0013]Thus, via the contact button 1, the and pack battery which connected the cell to the contact button 1 connects two cells in parallel, and is charged. That is, contact button 1A+ and 1B+ are connected to + side of the battery charger 4, contact button 1A- and 1B- are connected to - side of the battery charger 4, and it charges. The connected state when charging is shown in drawing 3. The battery charger 4 of this structure has the four charging terminals 5, and, as for the charging terminal 5 by the side of +, the charging terminal 5 by the side of - is connected to - side of a power supply via the diode at + side of a power supply. From a power supply, it will energize to a rechargeable battery and the charging terminal 5 of the battery charger 4 will be charged, if the contact button 1 of an and pack battery is contacted.

[0014]The battery charger 4 charges two rechargeable batteries connected in parallel mutually as the same voltage. For this reason, voltage of one of the two rises, and two nonaqueous secondary batteries do not serve as a surcharge, and are charged on the same conditions.

[0015]Preferably, at first, constant current charge of the battery charger 4 is carried out, and if the voltage of a cell rises on predetermined voltage and approaches a full charge, it will be changed to constant potential charge and will prevent a surcharge.

[0016]Drawing 4 shows the electric appliance 6 provided with the and pack battery shown in drawing 1 and drawing 2 enabling free desorption. It is electrically connected to the contact button (1) of the and pack battery with which it was equipped, and the electric appliance 6 shown in drawing 4 is provided with the terminal area which does the series connection of the rechargeable battery in an and pack battery. A terminal area has the four equipment terminals 7 connected to the contact button 1 of an and pack battery. Two cells are used for the equipment terminal 7, connecting in series. For this reason, the equipment terminal 7 connected to contact

button 1A- and 1B+ of an and pack battery is connected inside. The equipment terminal 7 connected to contact button 1A+ has connected to + side of apparatus the cell connected to contact button 1B- at - side of apparatus.

[0017]Drawing 5 shows the electric appliance 6 equipped with the and pack battery having four nonaqueous secondary batteries. What connected two cells in series is being used for the and pack battery with which the electric appliance shown in this figure is equipped, connecting in parallel. When charging, the and pack battery shown in this figure connects all the cells in parallel, and is charged.

[0018]The and pack battery furthermore shown in drawing 6 is provided with the switch 8 which connects an internal battery in series when using it. The switch 8 is connected to contact button 1A- and 1B+. If the switch 8 is carried out to one, two cells of each other will be connected in series. This and pack battery changes the switch 8 to one, when using it, setting to the electric appliance 6, and when charging, it changes the switch 8 to OFF. The and pack battery of this structure has the feature which can be used for the usual electric appliance 6 which has the equipment terminal 7 of +- as it is. There is the feature which carries out the series connection of the cell and can use it conveniently without operating the switch 8 manually if the mechanism which the switch 8 will be turned on if an and pack battery is set to the electric appliance 6, and will be come by off if it separates from the electric appliance 6 is used, although not illustrated.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The perspective view showing the and pack battery concerning the example of this invention

[Drawing 2] The circuit diagram of the and pack battery shown in drawing 1

[Drawing 3] The circuit diagram showing the state of charging the and pack battery shown in drawing 1

[Drawing 4] The circuit diagram showing the example of use of the and pack battery shown in drawing 1

[Drawing 5] The circuit diagram showing the example of use of the and pack battery of other examples of this invention

[Drawing 6] The circuit diagram showing the and pack battery of other examples of this invention

[Description of Notations]

1 Contact button

1A+ --- Contact button connected to + pole of one cell

1A --- Contact button connected to - pole of one cell

1B+ --- Contact button connected to + pole of the cell of another side

1B --- Contact button connected to - pole of the cell of another side

2 Casing

3 Lead

4 Battery charger

5 Charging terminal

6 Electric appliance

7 Equipment terminal

8 Switch

[Translation done.]

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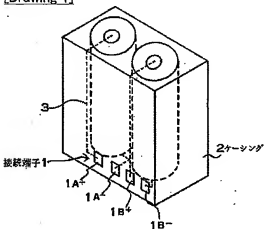
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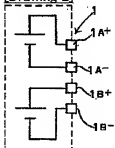
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DRAWINGS

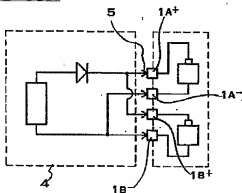
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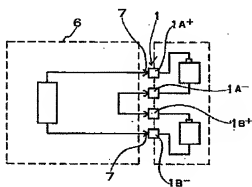
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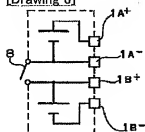
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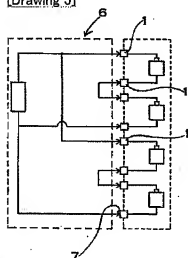
[Drawing 4]



[Drawing 6]



[Drawing 5]



[Translation done.]